

TECH. Division.

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THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

ISSUED BY
SCIENCE SERVICE

B and 21st Streets
WASHINGTON, D. C.

EDWIN E. SLOSSON, Director
WATSON DAVIS, Managing Editor



SUBSCRIPTION: \$5 A YEAR, POSTPAID

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Vol. IV. No. 163

Saturday June 28, 1924

A TABLE TRICK AND WHAT IT TEACHES

When that stage in the dinner comes when everything has been cleared from the cloth except coffee cups and ash trays, and when those who do not smoke are toying with the extra lumps of sugar instead, then some one may remark: "It's funny that you can't set sugar on fire with a match, isn't it?"

Everybody agrees that it is funny, so funny that they do not believe it. Sugar is food, all foods are combustible if they are not too wet. Those who know more about it are more positive; sugar is a carbohydrate and thus belongs to the same family as paper and wood. Why shouldn't it burn?

So they try it, setting up the domino on the saucer and holding a match to the edge or corner of it. But all they can get is a dull smoulder and a bad smell. The sugar softens, blackens but refuses to inflame.

They turn to the man who propounded the paradox and ask: "How do you explain it? Why can't you set sugar on fire?"

He takes his cigar from his mouth and remarks with a quizzical smile, "I can. What I said was that it is funny that you can't.

This starts a chorus of incredulity. "Let's see you", demand the skeptical, "Bet you can't", assert the mercenary-minded, who never takes an interest in a conflict of opinion unless they have money at stake.

He accepts the challenge and perhaps the wagers. He sets up his lump of sugar, touches it with a match and it flames up promptly and goes on burning with a sooty flame.

Only the most observant of the tableful have noticed that he had first clumsily dropped the lump of sugar in the ash tray or with apparent inadvertence had touched it with the tip of his cigar. This is the secret of it, that a slight smear of ash from cigar or cigaret will so lower the ignition point of sugar that the heat of a match is sufficient to set it afire. Yet the ash does not act as kindling. It is not combustible. It has already been burned. And sugar alone will not inflame in the heat of an alcohol lamp, a gas jet or even the powerful Bunsen burner. It merely melts and chars. It may be consumed but does not burn freely.

This curious reaction has been thoroughly studied by Hedvall who had tried all sorts of chemicals on sugar in a Bunsen flame to find out what it is that

May 17, 1964

Dear Mr. [illegible]

[illegible]



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[The following text is extremely faint and largely illegible. It appears to be a formal letter or memorandum, possibly related to a diplomatic or administrative matter. The text is organized into several paragraphs, with some lines indented. The content is too faded to transcribe accurately.]

causes the effect. The carbonates of sodium and potassium, such as exist in cigar ash, were among the most effective in lowering the temperature of combustion of sugar. Various other oxides of alkalies or alkaline earths, such as lime, will work the same. Zinc oxide is the best of all. The sugar touched by this will flame and crackle and burn completely.

Common salt and the sulfates of iron and copper will cause the sugar to burn, but only in part, leaving a black porous residue. Silica and the oxides of the heavy metals have no effect.

This simple experiment is a good example of what the chemist calls "catalysis". He does not know what it is but he has learned how to use it. It has been found in many cases that the presence of a minute amount of an inert substance, like the ash here, will greatly accelerate a reaction and yet is not used up in the process. A finely divided metal often acts as a catalyst. Platinum is the best, but being so expensive some cheaper metal, such as nickel or iron, is more commonly employed. It is by means of such a catalyst that sulfuric acid is now made; that the nitrogen of the air is fixed for use as fertilizer in the form of ammonia or nitrates; that cottonseed oil is combined with hydrogen to form a solid fat. The use of catalysts is adding millions annually to the wealth of the world, yet in most cases the manner of their action is not understood.

READING REFERENCE - Slosson, Edwin E. Creative Chemistry. New York. Century Company, 1920.

GASES DENSE AS METALS IN STARS

Pressure in the interior of the stars is so immense that it breaks the molecules of matter apart, with the result that gases may be compressed to the density of metals and yet behave as gases, according to Prof. A.A. Eddington, English astronomer.

The compressibility of gas under earthly conditions, says Professor Eddington depends upon the size of the gas molecules, which in turn depends upon the number of electrons it contains and upon their orbits about the central nucleus. Gas molecules behave somewhat as rigid spheres, and a limit to possible compression is reached when the spheres become tightly packed.

But at the high temperatures within the stars these spheres are all broken up and a rearrangement of their parts, or electrons becomes a possibility, much as a complicated machine if taken down, may be packed into a smaller space. So Professor Eddington sees no difficulty in assuming that true gases as heavy as platinum, or 20 times as heavy as water, may exist in the interiors of some of the stars.

Similarly he finds it possible that solid matter may be so compressed as to have a density of 50,000 times that of water, or inconceivably greater than anything of which we have any direct knowledge. Such a condition is indicated in the make-up of the star which is a faint companion to Sirius, the brightest star in the sky. This little star apparently has a diameter only about three times that of the earth, while its mass approaches that of the sun. As a result, its density should be about 50,000 times that of water.

EDUCATED SNAIL LEARNS TO SPEED

A snail may be a bit slow, but he can be made to learn by experience. At least that was the experience of Mary Pinkey Mitchell's trained snail, a story told in Science. Miss Mitchell is a student in the department of education psychology at the University of Denver, and her success in educating the humble snail is reported by Prof. Thomas R. Garth of that institution.

The snail was taught to find his way out of a maze. The impulse which compelled him to do this was a powerful light, from which he sought to escape, as snails prefer darkness. Also, they like to hibernate in the winter, but this little pet of science was kept on the job by warming him in a improvised incubator.

He rewarded the trust imposed upon him. The average time of his exit from the maze in his first five trials was 857 seconds, while for five recent trials he averaged only 315 seconds. It only took him 102 trials to accomplish this. In the first five trials he made four errors; now he makes no errors at all and is getting speedier and speedier every day with the prospect that he will soon attain the maximum speed of which snails are capable.

His performance indicates, his preceptors say, "learning of a more or less permanent character". At least he has learned something from his own mistakes, and his speed is considerable when one considers the weight of his name. It is "*Goniobasis pleuristriata* Say". No doubt he prefers to be addressed by it for he is an educated snail.

READING REFERENCE - Kellogg, Vernon L. Mind and Heredity, Princeton, Princeton University Press, 1923.

GRADUATED AMPLIFIERS FOR HARD OF HEARING

Three stage amplifiers, with means for delivering voice currents of several different volumes, is the latest method of helping the partially deaf to hear. Prediction of the eventual equipment of all places of public assembly with such devices was made by Dr. Harvey Fletcher in an address to a convention of the American Federation of Associations for the Hard of Hearing at Washington. Many of his audience were using such a system.

Loudness alone is not the open sesame for the hard of hearing, according to Dr. Fletcher. Studies made under his direction in the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company show that people whose hearing has been reduced by more than 60 per cent. can possibly be benefited by an amplifier, but they will never be able to understand what is said as well as persons whose hearing is better than 60 per cent. Hence the disappointment of many whose desire to reestablish communication with their fellow men has led them to believe extravagant claims of certain unscrupulous deaf set manufacturers.

In explaining to his audience how the proper loudness is determined, Dr. Fletcher brought out several interesting points. A person having 30 per cent. less hearing than normal will have little difficulty in understanding ordinary conversation at three feet from the speaker. One having 40 per cent. less would miss

1. The first part of the report deals with the general situation of the country and the progress of the work during the year.

2. The second part of the report deals with the results of the work done during the year, and the progress of the various projects.

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many consonants, but could still follow the conversation by paying close attention. One who has 50 per cent. loss can hear only the vowel sounds, and cannot understand unless the speaker talks loudly or close to his ear. With a 60 per cent. loss, nothing would be heard at all with the speaker three feet away, but by talking as loudly and close to the ear as possible, much can be understood. For greater deafness, no amount of loudness will be of much service, as the upper limit of the ear's response has been reached, and further increase will be painful or even injurious.

As a practical means of telling whether any device will be of assistance, Dr. Fletcher gave the following simple test: Have a friend speak simple sentences directly into your ear. If you can interpret them without difficulty, then a hearing aid can be designed which will make it possible to obtain the same interpretation. But if the speaker raises his voice to a very loud tone and you are still unable to understand, then probably no aids on the market can assist you.

The fallacy that deafened persons can hear better in noisy surroundings was disposed of by Dr. Fletcher with this explanation: The affect of noise is the same as an impairment of hearing. Noise in the average room is equivalent to a 20 per cent loss of hearing; New York's subway racket is as serious as 48 per cent loss. Hence in a subway train the man of 48 per cent deafness is on a par with his normal companion. Both shout, and both are heard equally well - or ill.

ORGANIZATION TO STUDY TROPIC PLANTS

Recognition of the large and increasing importance of the part played in the economic life of the temperate zones by the products of the plants of the tropics is seen in the incorporation of the Tropical Plant Research Foundation, by some of the leaders in the United States in the knowledge of tropical plants. The foundation was initiated during the past year by a committee of the National Research Council and was incorporated June 6 in the District of Columbia.

The particular objects of the Foundation will be to promote the study of the plants and crops of the tropics; to conduct investigations and to publish the results of them; and to establish and maintain such temporary or permanent stations and laboratories in tropical countries as may be necessary for the accomplishment of these objects.

The necessity for this study is stated by the organizers of the Foundation to be the economic dependence of the temperate zones upon the tropics, from which come many of the necessities of modern life. This dependence will increase in the future. The quantities of sugar and oils, fiber and rubber, coffee and cacao, fruits and vegetables, that are imported annually are only the vanguard of the future supplies that will be drawn from the tropics. The production, preparation, and shipment of these products involve problems that have as yet received little study. With the exception of the areas under the immediate jurisdiction of the United States, the tropical agriculture of the Western Hemisphere does not have the counterpart of the governmental and institutional agencies which contribute so much to crop production within the United States.

The industrial importance of the scheme is recognized in the Board of Trustees, four of whom will represent industry. The other five will be scientists, chosen from several national societies more closely identified with the projected

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work. The initial board consists of George P. Ahern, former chief forester of the Philippines, J. T. Crawley, former director of Cuban and Porto Rican Experiment Stations, V. M. Cutter of the United Fruit Co., Dr. William Crocker, director of the Thompson Institute, Dr. R. A. Harper, National Research Council, Dr. L. R. Jones, head of the department of plant pathology at the University of Wisconsin, H. C. Larkin, president of the Cuba Railway company, Dr. S. C. Prescott of the Massachusetts Institute of Technology, and Dr. D. L. Van Dine of the American Society of Economic Entomologists. The scientific director and general manager will be Dr. W. A. Orton, now with the Bureau of Plant Industry of the U. S. Department of Agriculture.

Dr. Jones will be the first president of the Foundation, and Dr. Harper will be vice-president. The administrative headquarters will be in Washington. Much of the laboratory work will be done at the Thompson Institute, Yonkers, N. Y., and field laboratories will be established in the tropics as needed.

NEW SOUNDING METHOD IMPROVED BY COAST SURVEY

Accurate determinations of the velocity of sound in sea water, which will make possible the further development of the sonic depth finder in marine survey work, have been made by the U. S. Coast and Geodetic Survey. The speed of the sound waves under water has been found to vary so greatly with the temperature, pressure, and salinity that unless these are known the sonic method of sounding the depths of the sea is apt to be inaccurate. The problem has been to work out some sort of theoretical velocity which might be safely used in this work.

The oceanographic cruise last fall of the Coast and Geodetic Survey steamer Guide from the east to the west coast by way of Porto Rico and the Panama Canal, and the subsequent work of that vessel on the Pacific Coast led to results which went far toward a solution of this problem. Wire soundings were taken at many places ranging in depth up to more than five miles. Sonic soundings were taken at the same time, and the temperature of the water and its salinity measured or calculated for various depths.

As a result, it has been found possible to deduce a theoretical velocity for the sound waves at many places, and under differing conditions which when used for computing depths by the sonic method and compared with those obtained by wire soundings, showed very slight errors.

The sonic depth finder was developed by Dr. H. C. Hayes of the Naval Research Laboratory, Bellevue, D. C. It measures the time taken for sound to travel to the bottom of the ocean and back again and has been used for deep sea soundings by Navy vessels in various parts of the ocean, especially off the Southern California coast. Sound travels in sea water at a speed of from 4800 to 5000 feet a second, and the importance of determining this velocity accurately if accurate soundings are to be made, is evident.

READING REFERENCE - Murray, John. The Ocean. New York, Henry Holt and Co. 1913.

DRUG ADDICTS FEWER FEDERAL REPT SAYS

Drug addiction is on the decline. There are now probably not more than 150,000 addicts in the United States and their number is decreasing, says a report just published by the U. S. Public Health Service. This report is the result of a study of the extent and trend of drug addiction in the United States made by Dr. Lawrence Kolb and A. G. Du Mez, pharmacologist of the Public Health Service. It finds the peak of drug addiction was reached about 1900 when there may have been more than 250,000 addicts, and that the number is now steadily on the decline.

The estimate is based on the findings of numerous investigators and the report of physicians and of addiction clinics during the past 25 years. The highest estimate, made in 1915 gave a total of 269,000 victims. The lowest, based on the experience of the army draft figures, gives a total of 99,500. The former was made in the state of Tennessee and is believed to have been too high, since investigators found that there were proportionately more addicts in the South than in the North.

The reasons for the conviction of the investigators that drug addiction is decreasing are given as the increasing efficacy of measures for the control of the drug trade, the prohibition of imports of smoking opium and the increasing caution exercised by physicians in prescribing habit-forming drugs.

Estimates of the maximum total number of addicts are also derived from the known amount of drugs imported, and the report states:

"To supply with their daily dose the large number of addicts asserted by some to be residing in this country would require enormous quantities of narcotics - quantities far in excess of those imported at the present time or during any period in the past!"

The period of the greatest importation of opium per capita was the decade ending with 1900. Assuming that all of it was used to supply addicts with either opium or morphin, the total number of victims could not have been more than 246,000. The report adds that the substitution of heroin for morphin would only increase this total by 12 per cent., and the imports of opium at present are less than one-fourth that of 25 years ago. The importation of smoking opium is forbidden.

As to cocaine, the report states:

"The amount of cocaine produced in the world as well as that imported into the United States has always been small in comparison with opium. The number of addicts in the United States using cocaine alone, based on legitimate importation and assuming that all of the coca leaves and cocaine imported annually was used for the satisfaction of addiction, could never have been more than 18,300."

There are more addicts in prison at present as compared with former years but this the investigators believe to be due to rigid enforcement of recent laws and not to any increase in addiction, since they hold that the present known importations are hardly more than the legitimate needs of medicine. Prison addicts are also thought to be due to the increase in the delinquent type of addict as compared with the normal individual who became an addict from medical use. Few cases of recent addiction, the investigators say, can be attributed to the prescribing of the drugs by physicians. Summing up, the report concludes:

"From the trend which narcotic addiction in this country has taken in recent

years as a result of the attention given the problem by the medical profession and law enforcement officers, it is believed that we may confidently look forward to the time, not many years distant, when the few remaining addicts will be persons taking opium because of an incurable disease, and addicts of the psychopathic, delinquent type who spend a good part of their lives in prison."

TIDAL MOTOR MADE BY BULGARIAN

A motor for the utilization of the power of the waves and tides has been designed and put to the test by a Bulgarian engineer, M. Vodenitcharoff, who has been experimenting for 10 years and has now produced a device sufficiently successful to enlist the support of the Bulgarian government, according to reports received at Vienna from Sofia.

The principle of the machine, the fifth which the inventor, has tried, is as follows: A stage, resting on piles is run from the shore into the sea. From this a "receiver" or float, weighing about 20 tons, is hung by a system of chains run over reels of special construction which put into motion a series of cog wheels. The receiver is fastened to the stage in such a way as to move easily in every direction according to the movement of the waves. Every movement of the surface of the water produces a corresponding movement of the receiver.

These irregular and chopping movements are transmitted by the chains and wheels into a regular movement in one and the same direction. Trials of the machine have, so reports say, been remarkably successful and have secured the support not only of the government of Bulgaria but the Chamber of Industry of the city of Burgas. Further experiments on a larger scale are to be made.

SIMPLE SCIENCE

By WOW

BREAD

The nicer our food the weaker our stomachs. The first bread was made out of acorns and beech-nuts, so the Ancients had to have strong stomachs to digest it.

The early Egyptians went in for better flour with stronger flavor, so they used barley, wheat, etc., and kneaded the dough with their feet. Today all people need dough. That's because we can't get bread without it.

Wheat flour contains about seventy per cent. of starch, ten per cent of gluten, twenty per cent. of other things including water. The gluten contains nitrogen and is what makes the dough sticky and elastic. To make a high, well-piled loaf of bread the gluten must be plentiful and of good quality. That's why different flour produce different grades of bread, because the gluten varies in amount and especially in quality. European wheat is usually weak in gluten and American hard wheat strong in gluten.

In order to make the dough rise we usually use yeast. At hotels when

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CHICAGO, ILLINOIS

TO THE HONORABLE THE PRESIDENT OF THE UNIVERSITY OF CHICAGO
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guests wish to rise without being called they eat self-raising flour for supper. If they wish to stay awake all night they eat pie and fruit cake.

Yeast is a vegetable and it resembles children since its main object in life seems to be to eat sugar. In doing so it converts the sugar into alcohol and carbonic acid gas. In breadmaking the yeast feeds on the sugar in the flour, and the gas formed swells up the elastic dough. When baked the alcohol evaporates and some of the starch on the outside is converted into dextrin, which is pasty and causes the various constituents of the dough to stick together and form the crust.

Bakers used to be severely treated in older times. When bread went to a high price it was the custom to hang the baker or two each time. When it was short weight they nailed the baker to his door-post by his ear. Fortunately for the baker this custom has become extinct. Another extinct custom was that of raining bread each morning for the Israelites in the wilderness.

BOBBED HAIR THREAT TO HAIRPIN INDUSTRY

A combined attack of bobbed-haired bandits and German manufacturers upon the hairpin industry of the United States has been successfully repelled by government scientists. The enemy is wavering and is expected soon to be in full retreat.

Some time ago the girls' desire for shortened tresses drove the hairpin manufacturers almost to despair. For of what use is a hairpin if one has no rebellious locks? Do men wear hairpins? The climax was capped, so the speak, when the manufacturers discovered that the remnant of hairpin users preferred a German variety of pin with a blued finish that American manufacturers did not know how to equal.

The U. S. Bureau of Standards was appealed to and the scientists there discovered that "blued" pins equal to the German could be made cheaply by treating ordinary pins to a certain degree of heat. The alien invasion has been checked, but no scientific remedy has yet availed against the bobbed-hair enemies of the hairpin industry.

PLOUGHING MADE EASIER BY ELECTRICAL DEVICE

An ingenious electrical method for making ploughing easier has been invented by E. M. Crowther and W. B. Haines of the Rothamsted Experimental Station, at Harpenden, England.

A large part of the work done in ploughing is "wasted" as friction between the mouldboard and the soil. The idea behind the present method is to use the soil moisture to lubricate the mouldboard.

By insulating the coulter of the plough and passing a current from it through the soil to the mouldboard the water in the film surrounding the soil particles is caused to move to the mouldboard, where it acts in the same way as water put on tools by men digging in sticky soil.

The inventors have demonstrated the method, both by small scale experiments in the laboratory and by actually measuring the work done by a tractor in ploughing both with and without a current flowing as described. A self-contained unit was formed by having a 110 volt dynamo mounted on and driven by the tractor. On the electrified plots the tractor engine had the extra load imposed by the dynamo. In spite of this it was noticed that the engine "eased-up" over the electrified plots and the time records showed that the speed of ploughing was increased. The current in this case was 1 to 2 amperes per plough.

Though the inventors claim that the device has reduced the work done in ploughing, they say that the amount of this reduction is not sufficiently great to have any immediate practical value. Up to the present they have used the ordinary plough, modifying it the minimum possible, but they are hoping to develop the idea further along such lines as adapting the plough to this particular purpose and in its application to special types of soil which give trouble in ploughing and to mole drainage.

DOCTORS DOUBTFUL OF CANCER SERUM

Doubt as to the alleged efficacy of the curative serum for cancer said to have been produced by Dr. T. J. Glover of Toronto, was expressed by many of the 15,000 physicians and surgeons assembled for the conventions of the American Medical Association and affiliated societies at Chicago.

It was pointed out by leaders of the American Medical Association that as long as three years ago Dr. Glover had made claims of being able to cure cancer. These claims were circulated among physicians with statements that the charge for one dose of the treatment would be five dollars and that at least five treatments must be given. The Journal of the American Medical Association quoted these claims in the issue of January 1, 1921.

The American Medical Association then referred the assertions of Dr. Glover to the Academy of Medicine of Toronto, his home town, and a summary of their report was published in the Journal of the American Medical Association of February 5, 1921.

This report stated that "the data examined has not convinced the committee that the results obtained by the use of Dr. Glover's serum were better than those obtained by similar methods introduced by others, and which have ultimately disappointed the hopes entertained of them". It was further stated that Dr. Glover had declined to permit the committee to visit his laboratory or to examine his cultures or experimental material, and had not acceded to the request of the committee that he demonstrate his ability to produce cultures of cancer cells, to produce cancers by inoculation, and to immunize animals against it.

Dr. Morris Fishbein, assistant to the editor of the Journal of the American Medical Association, in referring Science Service investigators to these published statements, said:

"Evidence indicates that controlled tests of the Glover cancer serum made by Francis Carter Wood, director of cancer research, Columbia University, show that the treatment has not the slightest effect on the growth of tumors of animals. The Glover method is in no sense established as either scientific or reliable."

NEW LOCOMOTIVES MAKE PYGMIES OF THE OLD

Passengers who have noted with relief that on the larger railway systems trains do not start with the tremendous jerk that was prevalent a few years ago but few of them are aware that the easy start is due to one of many major improvements recently effected in the steam locomotive. This particular device is called a "booster" and is really a separate engine, driving a set of small drivers to the rear of the main driving wheels, a report of the Engineering Foundation says. This permits an easy start, and the booster is cut out automatically when the speed exceeds 15 miles an hour. It is like starting an automobile on low gear.

Another quality of the modern locomotive is its endurance. Formerly they were designed for runs averaging about 150 miles, necessitating division points and expensive layovers at some such interval. Continuous runs of 825 miles are now made by oil burning locomotives, and runs of over 500 miles with coal burners.

Everyone thinks he knows all about the steam locomotive because it has been with us so long; but today we have a new locomotive, a power plant on wheels which has achieved an output in some cases of 13.5 pounds of steam per indicated horsepower hour, a record which puts the steam locomotive in the class of efficient non-condensing power plants. Locomotives are in service with power and flexibility enough to enable them to haul 10,000 tons at 18 miles an hour on level track, or to pull 4,500 tons on a ten minutes clearance ahead of a limited express, scheduled at 49 miles an hour for 90 miles without a stop.

SPOTS ON VENUS AROUSE INTEREST OF ASTRONOMERS

Bright and dark spots on the surface of the planet Venus have been noted by European astronomers during the recent favorable approach of the planet to the earth. A bright spot was seen near the south pole and a dark band crossed another bright area in the northern hemisphere. The latter was thought to be the shadow of an upper cloud on a lower one.

Conclusions as to the time of the planet's rotation on its axis, a question about which there has been much dispute, were discordant. Prof. A. Nissen, reporting in a German astronomical journal concluded that it was 23 hours and 56 minutes, but Dr. W. H. Steavenson saw no motion while he watched the spot and favored a longer period.

Albany is raising a fund for the erection of a statue to Joseph Henry, pioneer American scientist.

A recent health survey of several hundred fifth grade children showed that more than one-third got less than ten hours sleep and that another third drank no milk.

The first telephone and the first railway in China were each put to use in Shanghai.
